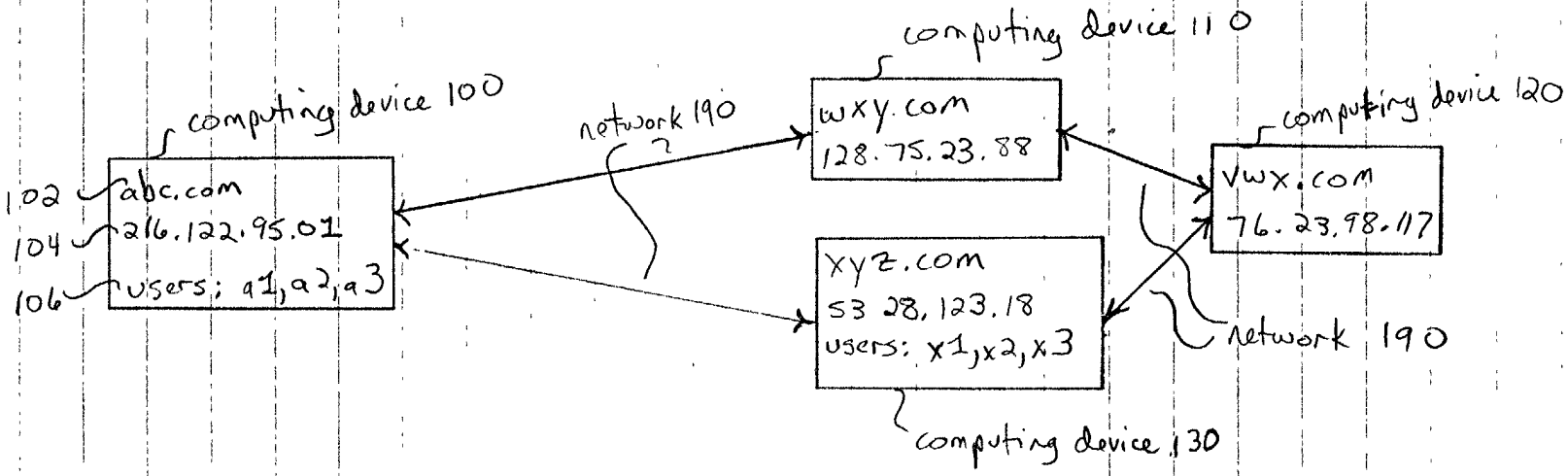

Fig. 1A (Prior Art)

Example message generated by User A1's local mail program

140
Date: Mon, 27 Nov 00 10:18:52 ~ 141
From: "Alan Smith" <a1@abc.com> ~ 142
To: x1@xyz.com, a2 ~ 143
Subject: Test Message ~ 144

150
This message is a test. The end.

Figure 1B (Prior Art)

Example message as modified by local computing device 100 Sendmail program

From a1@abc.com Mon Nov 27 10:19:23 2000 ~ 145
Message-Id: <9631121611.AA02124@abc.com> ~ 146
Date: Mon, 27 Nov 00 10:18:52
From: "Alan Smith" <a1@abc.com>
To: x1@xyz.com, a2
Subject: Test Message

This message is a test. The end.

Figure 1C (Prior Art)

Example message as modified by remote computing device 130 Sendmail program

From a1@abc.com Mon Nov 27 10:19:23 2000
147 ~ Received: from abc.com [216.122.95.01] by xyz.com (8.8.4/8.8.4) with ESMTP id BF02C24;
Mon, 27 Nov 2000 10:21:46
Message-Id: <9631121611.AA02124@abc.com>
Date: Mon, 27 Nov 00 10:18:52
From: "Alan Smith" <a1@abc.com>
To: x1@xyz.com, a2
Subject: Test Message

This message is a test. The end.

Figure 1D (Prior Art)

Example SMTP exchange as computing device 100 Sendmail connects to computing device 130 Sendmail

220-xyz.com Sendmail 8.6.12/8.5 ready at Mon, 27 Nov 2000 10:22:23 –0800
220 ESMTP spoken here
161 ~ >>> EHLO abc.com
250-xyz.com Hello abc.com, pleased to meet you
250-EXPN
250-SIZE
250 HELP
>>> MAIL From:<a1@abc.com>
250 <a1@abc.com>... Sender ok
>>> RCPT To:<x1@xyz.com>
250 <x1@xyz.com>... Recipient ok
>>> DATA
354 Enter mail, end with "." on a line by itself
{*The message illustrated in Figure 1C is transmitted*}
>>> .
250 GAA20115 Message accepted for delivery
x1@xyz.com... Sent (GAA20115 Message accepted for delivery)
Closing connection to xyz.com
>>> QUIT
221 xyz.com closing connection

Figure 1E (Prior Art)

Example SMTP exchange as virtual computing device 200 Sendmail connects to computing device 130 Sendmail

220-xyz.com Sendmail 8.6.12/8.5 ready at Mon, 27 Nov 2000 10:22:23 –0800
220 ESMTP spoken here
261 ~ >>> EHLO bcd.com
262 ~ **250-xyz.com Hello bcd.com (abc.com), pleased to meet you**
250-EXPN
250-SIZE
250 HELP
>>> MAIL From:<b1@bcd.com>
250 <b1@bcd.com>... Sender ok
>>> RCPT To:<x1@xyz.com>
250 <x1@xyz.com>... Recipient ok
>>> DATA
354 Enter mail, end with "." on a line by itself
{*The message illustrated in Figure 2C is transmitted*}
>>> .
250 GAA20115 Message accepted for delivery
x1@xyz.com... Sent (GAA20115 Message accepted for delivery)
Closing connection to xyz.com
>>> QUIT
221 xyz.com closing connection

Error file

Host abc.com claimed to be bcd.com

Figure 2E

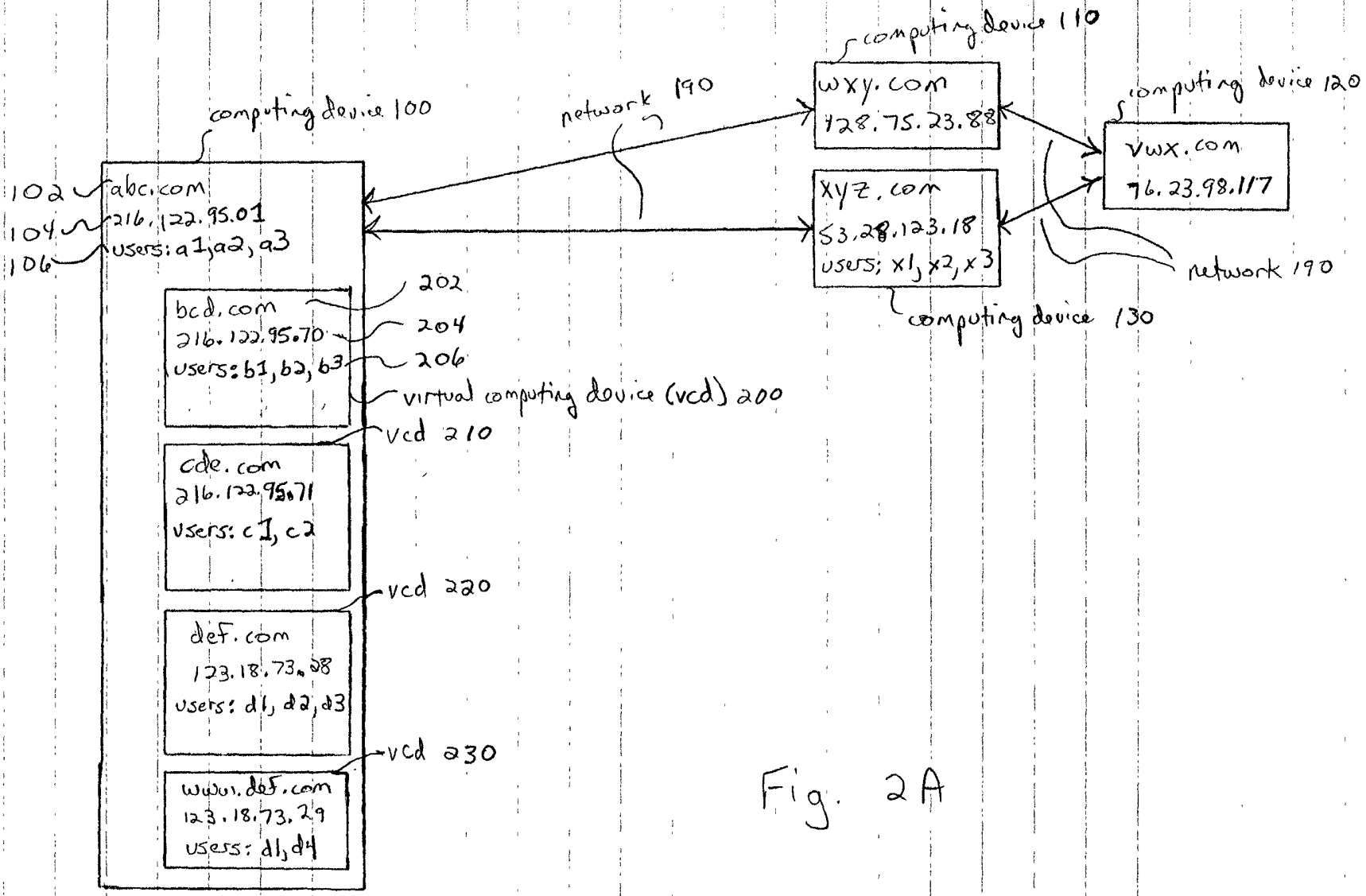
computing device 100
102
abc.com
104
216.122.95.01
106
users: a1, a2, a3
202
bcd.com
204
216.122.95.70
206
users: b1, b2, b3
virtual computing device (vcd) 200
vcd 210
cde.com
216.122.95.71
users: c1, c2
vcd 220
def.com
123.18.73.98
users: d1, d2, d3
vcd 230
www1.def.com
123.18.73.29
users: d1, d4
network 190
computing device 110
wxy.com
128.75.23.88
computing device 120
vwx.com
76.23.98.117
xyz.com
53.28.123.18
users: x1, x2, x3
network 190
computing device 130

Fig. 2A

Example message generated by User B1's local mail program

Date: Mon, 27 Nov 00 10:18:52
From: "Bob Smith" <b1@bcd.com> ~ 242
To: x1@xyz.com, b2
Subject: Test Message 2

This message is a test. The end.

Figure 2B

Example message as modified by virtual computing device 200 Sendmail program

From b1@bcd.com Mon Nov 27 10:19:23 2000 ~ 245
Message-Id: <3431121623.4B0213D@bcd.com> ~ 246
Date: Mon, 27 Nov 00 10:18:52
From: "Bob Smith" <b1@bcd.com>
To: x1@xyz.com, b2
Subject: Test Message 2

This message is a test. The end.

Figure 2C

Example message as modified by remote computing device 130 Sendmail program

From b1@bcd.com Mon Nov 27 10:19:23 2000
247 ~ Received: **from abc.com [216.122.95.01]** by xyz.com (8.8.4/8.8.4) with ESMTP id CD0A224;
Mon, 27 Nov 2000 10:21:46
Message-Id: <3431121623.4B0213D@bcd.com>
Date: Mon, 27 Nov 00 10:18:52
From: "Bob Smith" <b1@bcd.com>
To: x1@xyz.com., b2
Subject: Test Message 2

This message is a test. The end.

Figure 2D

Example message as modified by remote computing device 130 Sendmail program when sent by Virtual Domain Sendmail program on computing device 100

From b1@bcd.com Mon Nov 27 10:19:23 2000
347 Received: **from bcd.com [216.122.95.70]** by xyz.com (8.8.4/8.8.4) with ESMTP id CD0A224;
Mon, 27 Nov 2000 10:21:46
Message-Id: <3431121623.4B0213D@bcd.com>
Date: Mon, 27 Nov 00 10:18:52
From: "Bob Smith" <b1@bcd.com>
To: x1@xyz.com., b2
Subject: Test Message 2

This message is a test. The end.

Figure 3A

Example SMTP exchange as Virtual Domain Sendmail program on computing device 100 connects to computing device 130

220-xyz.com Sendmail 8.6.12/8.5 ready at Mon, 27 Nov 2000 10:22:23 –0800
220 ESMTP spoken here
361 >>> EHLO bcd.com
362 **250-xyz.com Hello bcd.com, pleased to meet you**
250-EXPN
250-SIZE
250 HELP
>>> MAIL From:<b1@bcd.com>
250 <b1@bcd.com>... Sender ok
>>> RCPT To:<x1@xyz.com>
250 <x1@xyz.com>... Recipient ok
>>> DATA
354 Enter mail, end with "." on a line by itself
{*The message illustrated in Figure 2C is transmitted*}
>>> .
250 GAA20115 Message accepted for delivery
x1@xyz.com... Sent (GAA20115 Message accepted for delivery)
Closing connection to xyz.com
>>> QUIT
221 xyz.com closing connection

Figure 3B

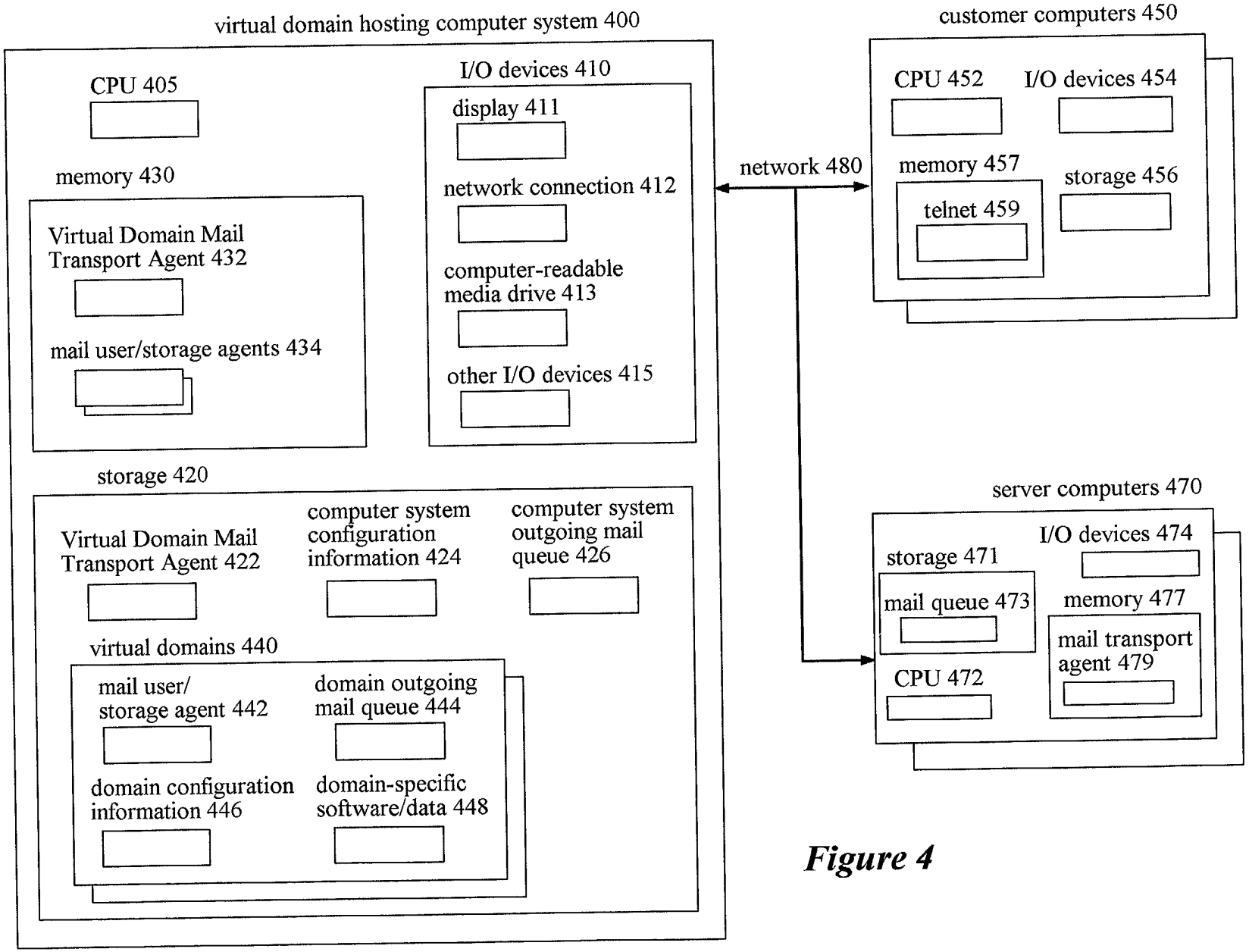
virtual domain hosting computer system 400
CPU 405
memory 430
Virtual Domain Mail Transport Agent 432
mail user/storage agents 434
I/O devices 410
display 411
network connection 412
computer-readable media drive 413
other I/O devices 415
storage 420
Virtual Domain Mail Transport Agent 422
computer system configuration information 424
computer system outgoing mail queue 426
virtual domains 440
mail user/ storage agent 442
domain outgoing mail queue 444
domain configuration information 446
domain-specific software/data 448
network 480
customer computers 450
CPU 452
I/O devices 454
memory 457
telnet 459
storage 456
server computers 470
I/O devices 474
storage 471
mail queue 473
memory 477
mail transport agent 479
CPU 472

Figure 4

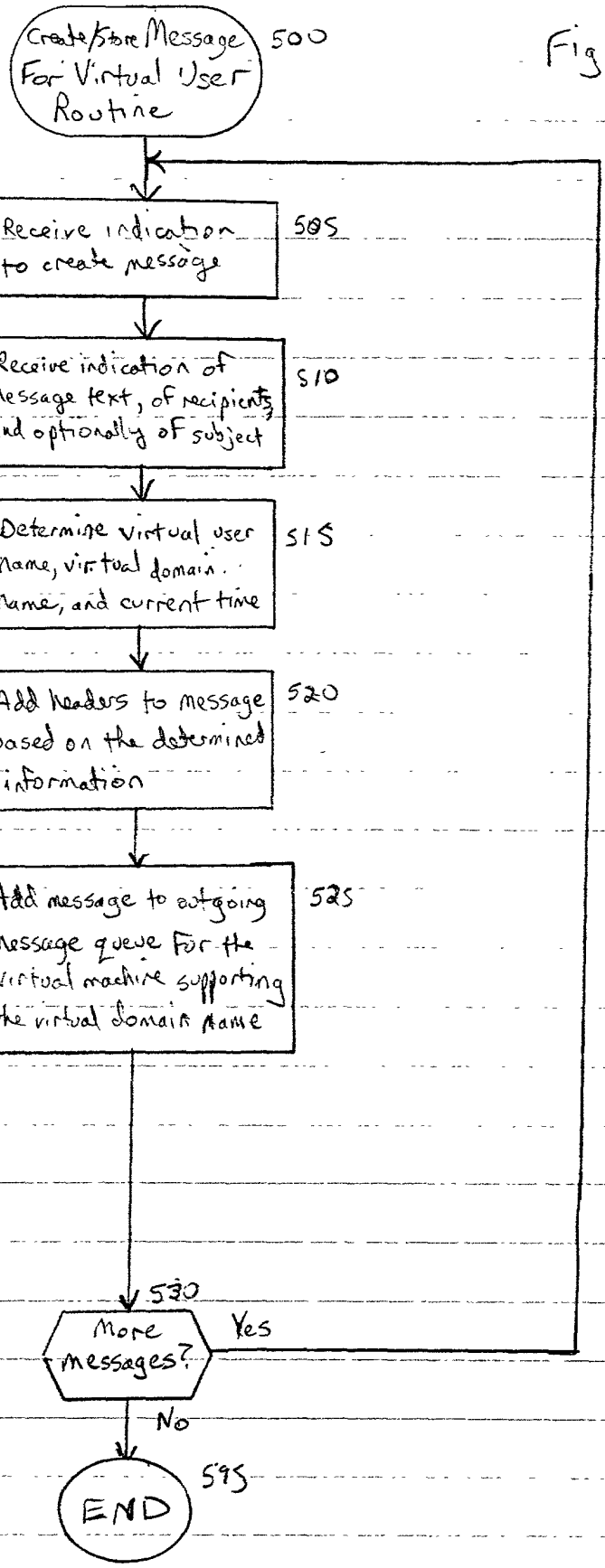
Create/Store Message For Virtual User Routine
500
Receive indication to create message
505
Receive indication of message text, of recipients and optionally of subject
510
Determine virtual user name, virtual domain name, and current time
515
Add headers to message based on the determined information
520
Add message to outgoing message queue for the virtual machine supporting the virtual domain name
525
530
More messages?
Yes
No
END
595

Fig. 5

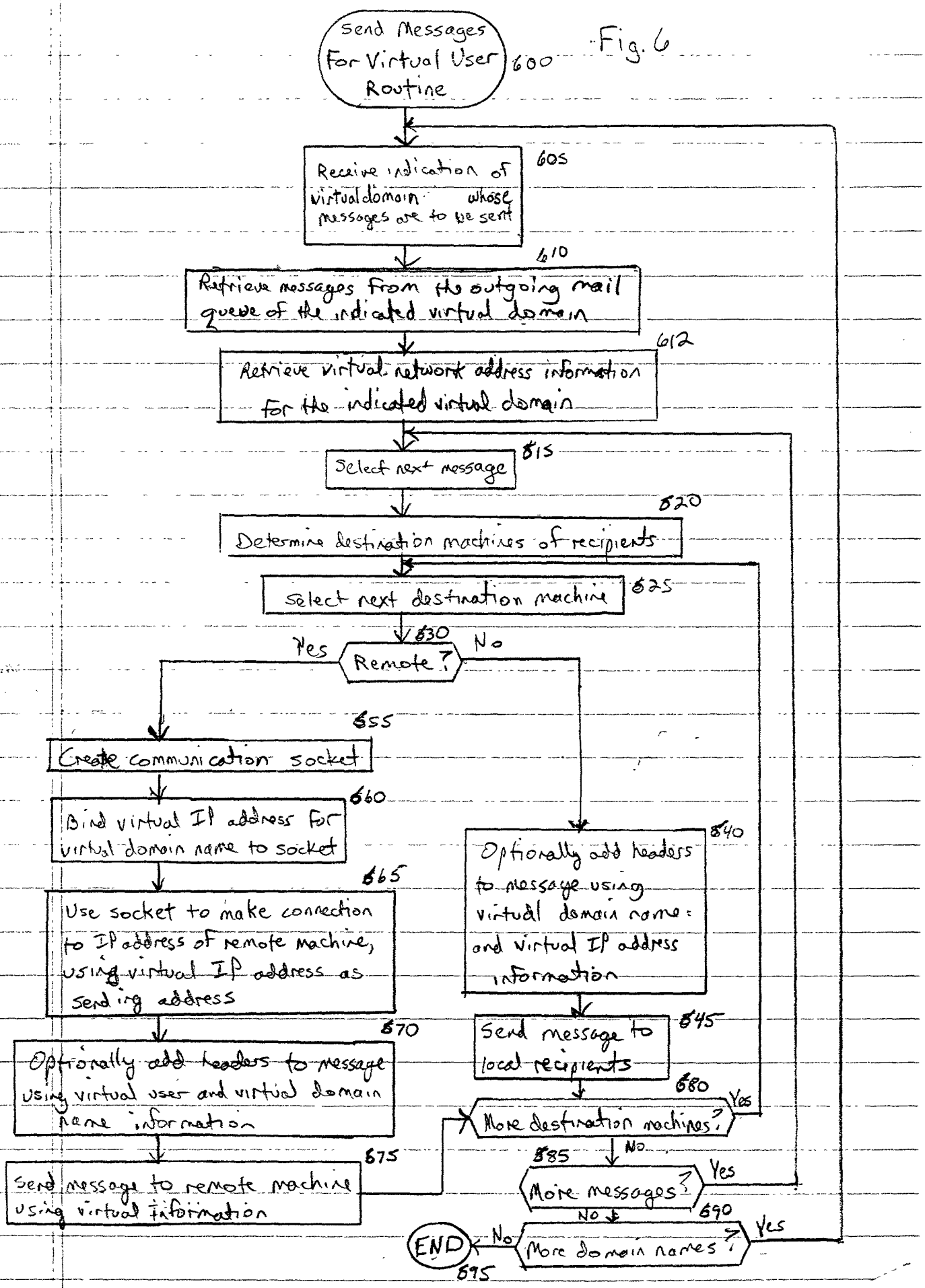
Send Messages For Virtual User Routine
600
Receive indication of virtual domain whose messages are to be sent
605
Retrieve messages from the outgoing mail queue of the indicated virtual domain
610
Retrieve virtual network address information for the indicated virtual domain
612
Select next message
615
Determine destination machines of recipients
620
Select next destination machine
625
Remote?
630
Yes
No
Create communication socket
635
Bind virtual IP address for virtual domain name to socket
660
Use socket to make connection to IP address of remote machine, using virtual IP address as sending address
665
Optionally add headers to message using virtual user and virtual domain name information
670
Send message to remote machine using virtual information
675
Optionally add headers to message using virtual domain name and virtual IP address information
640
Send message to local recipients
645
More destination machines?
680
Yes
No
More messages?
685
Yes
No
More domain names?
690
Yes
No
END
695

Fig. 6